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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,214	10/29/2003	Christine Hau-Riege	H1508	9775
47332	7590	12/15/2004	EXAMINER	
THE CAVANAGH LAW FIRM VIAD CORPORATE CENTER 1850 NORTH CENTRAL AVENUE, SUITE 2400 PHOENIX, AZ 85004			BREWSTER, WILLIAM M	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/697,214

**Applicant(s)**

HAU-RIEGE ET AL.

**Examiner**

William M. Brewster

**Art Unit**

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 16 is/are rejected.
- 7) ☒ Claim(s) 14 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>102903</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 9-13, 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato, US Patent No. 5,739,587.

Sato anticipates a method for manufacturing a metallization system capable of precluding stress-induced void formation in a portion thereof, the method comprising:  
in fig. 3, providing a semiconductor substrate 10;  
disposing a first portion of a conductive interconnect, a metallization system 41, 42 over the semiconductor substrate,  
the first portion having a width; and  
forming a plurality of apertures, void preclusion features, in the first portion of the conductive interconnect, labeled 60;

limitations from claim 2, the method wherein forming a first portion of the metallization system comprises:

disposing a layer of dielectric material 60 over the semiconductor substrate 10;  
forming at least one opening 41 in the layer of dielectric material, wherein a portion of the layer of dielectric material remains adjacent the at least one

opening and wherein the portion of the dielectric material that remains adjacent the at least one opening serves as the void preclusion feature; and filling the at least one opening with an electrically conductive material, col. 4, lines 30-39; limitations from claim 3, the method, wherein forming the at least one opening includes using an anisotropic reactive ion etch to form the at least one opening, col. 5, lines 21-27;

limitations from claim 4, the method, wherein the portion of the dielectric material that remains adjacent the at least one opening has a polygonal shape, fig. 1, bounded by 96;

limitations from claim 5, the method, wherein the polygonal shape is selected from the group of polygonal shapes consisting of a square, a rectangle, a pentagon, a triangle, a hexagon, a heptagon, and an octagon: fig. 1, triangle, bounded by 96;

limitations from claim 7, the method, in fig. 3, further including forming a second portion of the metallization system 45, the second portion laterally spaced apart from the first portion;

limitations from claim 8: the method, in fig. 3, further including coupling the first portion 41, of the metallization system to the second portion 45 of the metallization system with a third portion 110 of the metallization system;

limitations from claims 9, 10, 12, the method, in fig. 3, further including coupling the first portion of the metallization system 41 to the second portion of the metallization system 45 with a third portion of the metallization system 110,

wherein the first and second portions are separated from the semiconductor substrate by a first distance, thickness of 20 and 110, and the third portion is separated from the semiconductor substrate by a second distance, thickness of 110, wherein the second distance is different than the first distance; and the second distance is less than the first distance;

limitations from claim 13, the method, wherein disposing the first, second, and third portions of the conductive interconnect comprises:

in fig. 3, disposing a first layer of dielectric material, lower portion of 60, over the semiconductor substrate 10;

forming a trench, the width of 110, in the first layer of dielectric material;

filling the trench with electrically conductive material 110 to form a filled trench that serves as the third portion of the conductive interconnect;

disposing a second layer of dielectric material, upper portion of 60, over the filled trench;

forming a plurality of openings in the second layer of dielectric material, a first opening exposing a first portion 41 of the filled trench and a second opening exposing a second portion 45 of the filled trench; and

filling the plurality of openings with additional electrically conductive material, col. 4, lines 30-38, wherein electrically conductive material filling a first opening 41 of the plurality of openings serves as the first portion of the conductive interconnect and the electrically conductive material filling a second opening 45 of the plurality of openings serves as the second portion of the conductive interconnect;

limitations from claim 16, the method of claim 11, wherein forming the first, second, and third portions include, forming a first layer of dielectric material 60 over the semiconductor substrate;

disposing an electrically conductive material over the layer of dielectric material, col. 4, lines 30-38;

forming the first 41 and second portions 45 of the conductive interconnect from the electrically conductive material;

forming at least one opening, labeled 60, in each of the first and second portions of the conductive interconnect;

forming a second layer of dielectric material 70 over the first and second portions of the conductive interconnect;

forming first, left opening of 100, and second openings, right opening of 100, in the second layer of dielectric material, the first opening exposing the first portion of the conductive interconnect 41 and the second opening exposing the second portion 45 of the conductive interconnect; and

disposing additional electrically conductive material over the second layer of dielectric material, the second layer of electrically conductive material 100 filling the first and second openings in the second layer of dielectric material, top of 41 and 45.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato as applied to claims 1-7, 9-16 above.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato.

For claim 8, Sato does not specify dimensions for the widths of the first, second, or third portions of the metallization system. However, such dimensions may be optimized.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

***Allowable Subject Matter***

Claims 14, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*William M. Brewster*

9 December 2004

WB